CR-91 Event – Shelby County, AL
Preliminary Air Monitoring Summary
September 18, 2016 17:00

Prepared by
Center for Toxicology and Environmental Health, L.L.C. (CTEH®)
On Behalf of Colonial Pipeline

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Introduction

On September 9, 2016, the Center for Toxicology and Environmental Health, L.L.C. (CTEH®) initiated air monitoring in support of response efforts to the gasoline release in Shelby County, AL. This report presents the real-time air monitoring data recorded from September 18 2016 05:00 to September 18, 2016 17:00 CDT.

Real-Time Air Monitoring[1]

Real-time air monitoring was conducted to evaluate the potential airborne presence of gasoline-associated constituents, if any, during response operations. All instrumentation was calibrated at least once per day or per manufacturer's recommendations. Target analytes were measured as total volatile organic compounds (VOCs), oxygen, benzene, and flammability as the percent of the lower explosive limit (LEL) using remote telemetering RAESystems® AreaRAEs, hand-held instruments such as RAESystems® MultiRAE Pro/Plus' and UltraRAEs, as well as Gastec® colorimetric detection tubes.

During this monitoring period, eight benzene, five LEL and nine VOC action level exceedances were recorded during worker activity monitoring, including instantaneous VOC and benzene readings which were recorded above the action level. When necessary, workers egressed the area in accordance with the approved sampling and analysis plan.

Table 1, below, presents the results of real-time air monitoring using hand-held instruments. Maps of the incident site location and locations of hand-held real-time air monitoring readings are provided in Appendix I.

[1] *Real-time air monitoring refers to the use of hand-held instruments that provide near-instantaneous readings of an airborne chemical concentration without the need for laboratory analysis.*

Table 1: Hand-Held Real-Time Air Monitoring Summary[1]

September 18, 2016 05:00 to September 18, 2016 17:00

Location Category	Analyte	Instrument	Count of Readings	Count of Detections	Range of Detections[2,3]
Worker Activity Monitoring	Benzene	UltraRAE	108	18	0.05 - 300 ppm
	Gasoline	Gastec #101L	3	0	<5 ppm
	Hexane	Gastec #102L	3	0	<1 ppm
	%LEL	MultiRAE Plus	33	0	<1 %
		MultiRAE Pro	183	5	4 - 20 %
	Toluene	Gastec #122	2	0	<1 ppm
		Gastec #122L	2	0	<0.5 ppm
	VOCs	MultiRAE Plus	37	13	0.1 - 17.1 ppm
		MultiRAE Pro	183	51	0.1 - 1900 ppm
	Xylene	Gastec #123	2	0	<1 ppm
Community	LEL	MultiRAE Pro	2	0	<1 %
	VOC	MultiRAE Pro	2	0	<0.1 ppm
Site Characterization	Benzene	UltraRAE	5	2	5 - 100 ppm
	%LEL	MultiRAE Pro	5	2	11 - 56 %
	VOC	MultiRAE Pro	6	5	6.5 - 1250 ppm

[1]Please Note: The data displayed in the above table has not undergone complete QC analysis and is presented in a preliminary format.
[2]Maximum detections preceded by the "<" symbol are considered non-detections below the instrument limit of detection (LoD) value to the right.
[3]Numbers are the raw values, no correction factors have been applied.

During this monitoring period remote telemetering equipment recorded 5060 detections of VOCs above the CTEH established action level of 30 ppm and 14 detections of LEL above the CTEH established action level of 10% (3% as raw values on LEL sensors).

Table 2 (below) summarizes remote telemetering AreaRAE data for this monitoring period. For this reporting period AreaRAE monitoring data may contain drift events[2]. Appendix I and Appendix II include location maps and graphs for remote telemetering data, respectively. [4]

[2] Drift is defined as any interference in the PID's or electrochemical sensor's ability to accurately report the concentration of a chemical in the atmosphere. Humidity, rapid temperature changes, and compromised batteries are examples of common sources of drift.

Table 2: Remote Telemetering Real-time Air Monitoring Summary[1,3]

September 18, 2016 05:00 to September 18, 2016 17:00

Unit	Location Description	Analyte	Count of Readings	Count of Detections	Range of Detections[2]
AR01	2A Compressors	LEL	5258	95	1.2 - 5 %
		O_2	5258	5258	20.9 - 21.6 %
		VOC	5258	4691	0.1 - 423.8 ppm
AR04	2A Frac Tank Staging	LEL	8133	0	<1 %
		O_2	8133	8133	20.9 - 20.9 %
		VOC	8133	5171	0.1 - 57.6 ppm
AR05	2A Recovery	LEL	6301	0	<1 %
		O_2	6301	6301	20.9 - 20.9 %
		VOC	6301	2491	0.1 - 45.1 ppm
AR06	East of Release Site/Near Stopple 2	LEL	8290	0	<1 %
		O_2	8290	8290	20.9 - 21.9 %
		VOC	8290	2655	0.1 - 46 ppm
AR07	2B Recovery	LEL	8070	0	<1 %
		O_2	8070	8070	20.9 - 20.9 %
		VOC	8070	4976	0.1 - 78.6 ppm
AR08	Main Staging Area Frac Tanks	LEL	8119	0	<1 %
		O_2	8119	8119	20.5 - 21.3 %
		VOC	8119	5755	0.1 - 35.6 ppm
AR09	Release Site	LEL	8354	0	<1 %
		O_2	8354	8354	20.7 - 20.9 %
		VOC	8354	4560	0.1 - 118.1 ppm
AR10	On path between Recovery 2A and Recovery 2B.	LEL	8133	0	<1 %
		O_2	8133	8133	20.4 - 20.9 %
		VOC	8133	6428	0.1 - 157.2 ppm
AR11	Main Staging Entrance East of TRG checkpoint	LEL	6485	0	<1 %
		O_2	6485	6485	20.9 - 20.9 %
		VOC	6485	0	<0.1 ppm
AR12	Boom Site #2	LEL	2740	0	<1 %
		VOC	2740	27	0.1 - 0.1 ppm
AR13	TRG Checkpoint 2 - access to stopple 1, Recovery 2A and 2A Frac Tank Staging Area.	LEL	8100	0	<1 %
		O_2	8100	8100	20.9 - 21.3 %
		VOC	8100	4109	0.1 - 0.9 ppm
AR14	Cab of excavator at release site	LEL	4054	0	<1 %
		O_2	4054	4054	20.9 - 20.9 %
		VOC	4054	99	0.1 - 5.6 ppm

[1]*Please note: The data displayed here has not undergone complete QA/QC analysis and is presented in a preliminary format.*

[2]*Maximum detections preceded by the "<" symbol are considered at the limit of detection (LoD) value to the right.*

[3]*LEL and VOC values are raw values, correction factors have not been applied.*

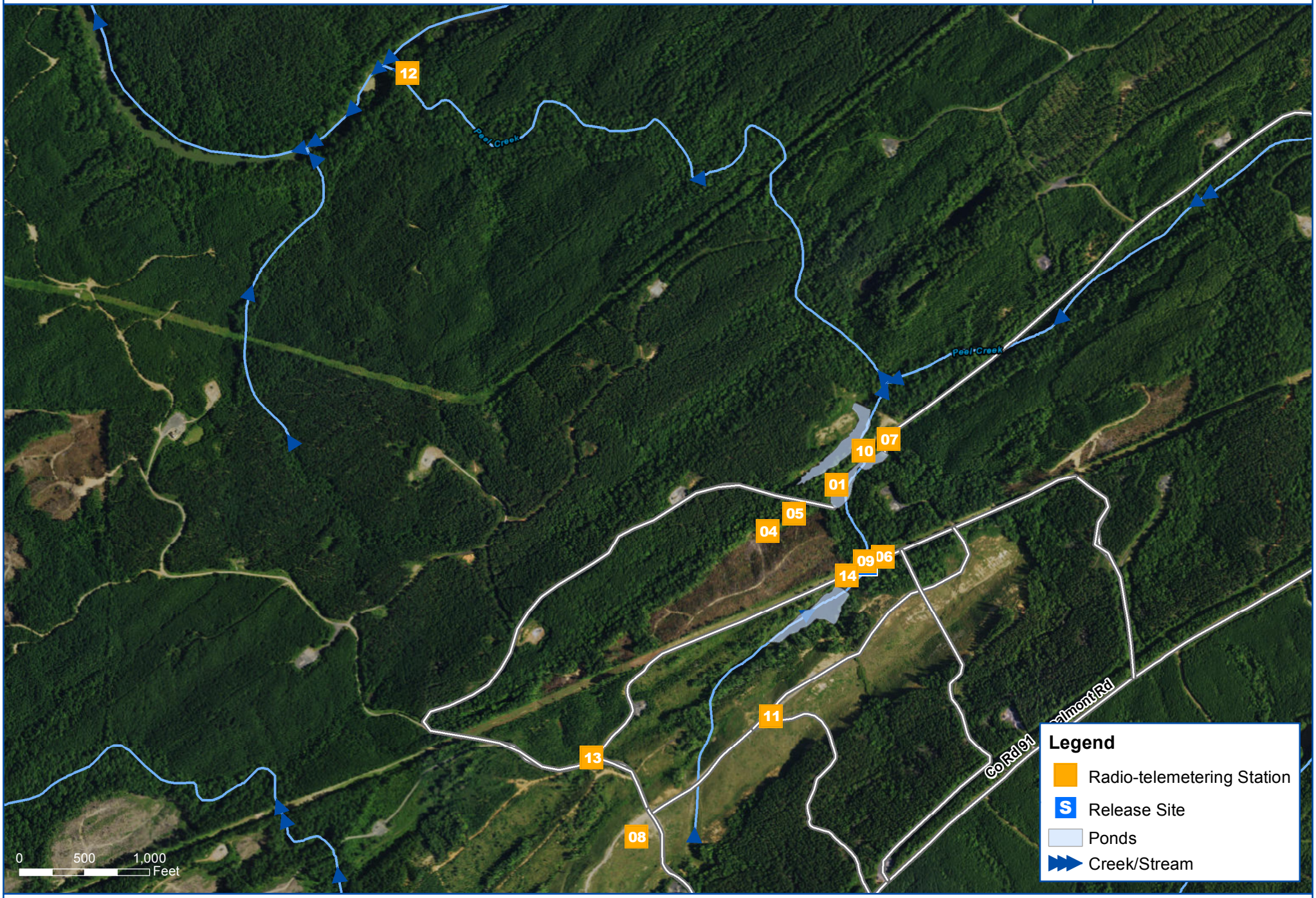
Appendix I:

Site Location, Hand-Held Real-Time Air Monitoring Location, and Remote Telemetering Air Monitoring Location Maps

Radio-telemetering Real-time Air Monitoring Station Locations

CR-91 Event 9/18/2016

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, LA

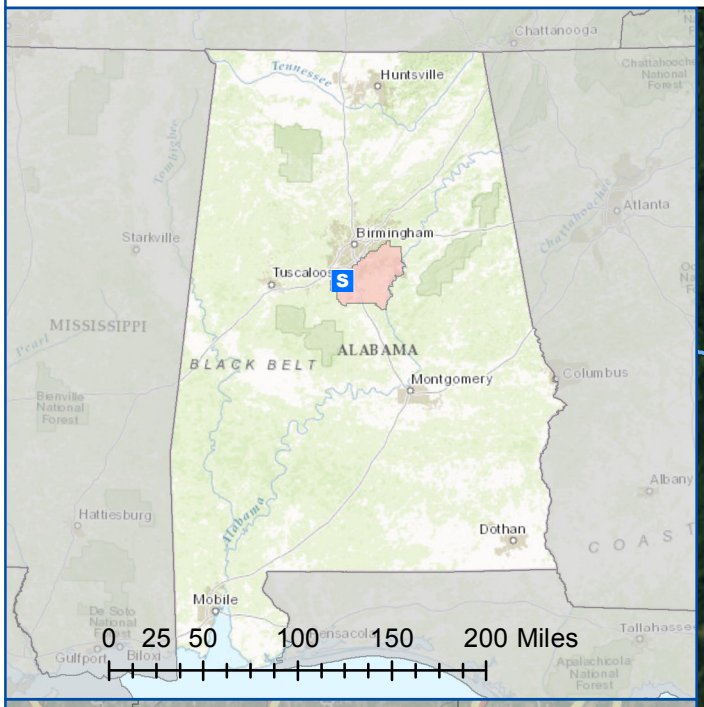


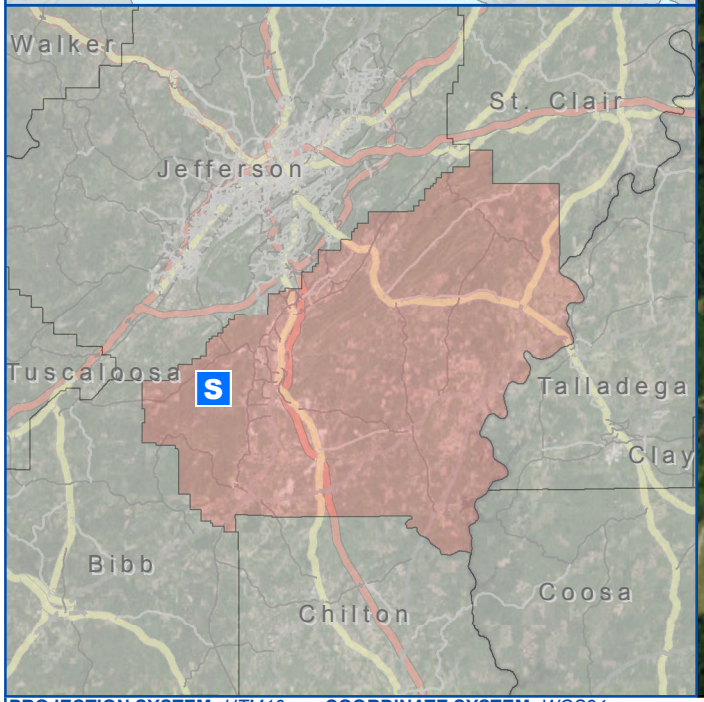
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

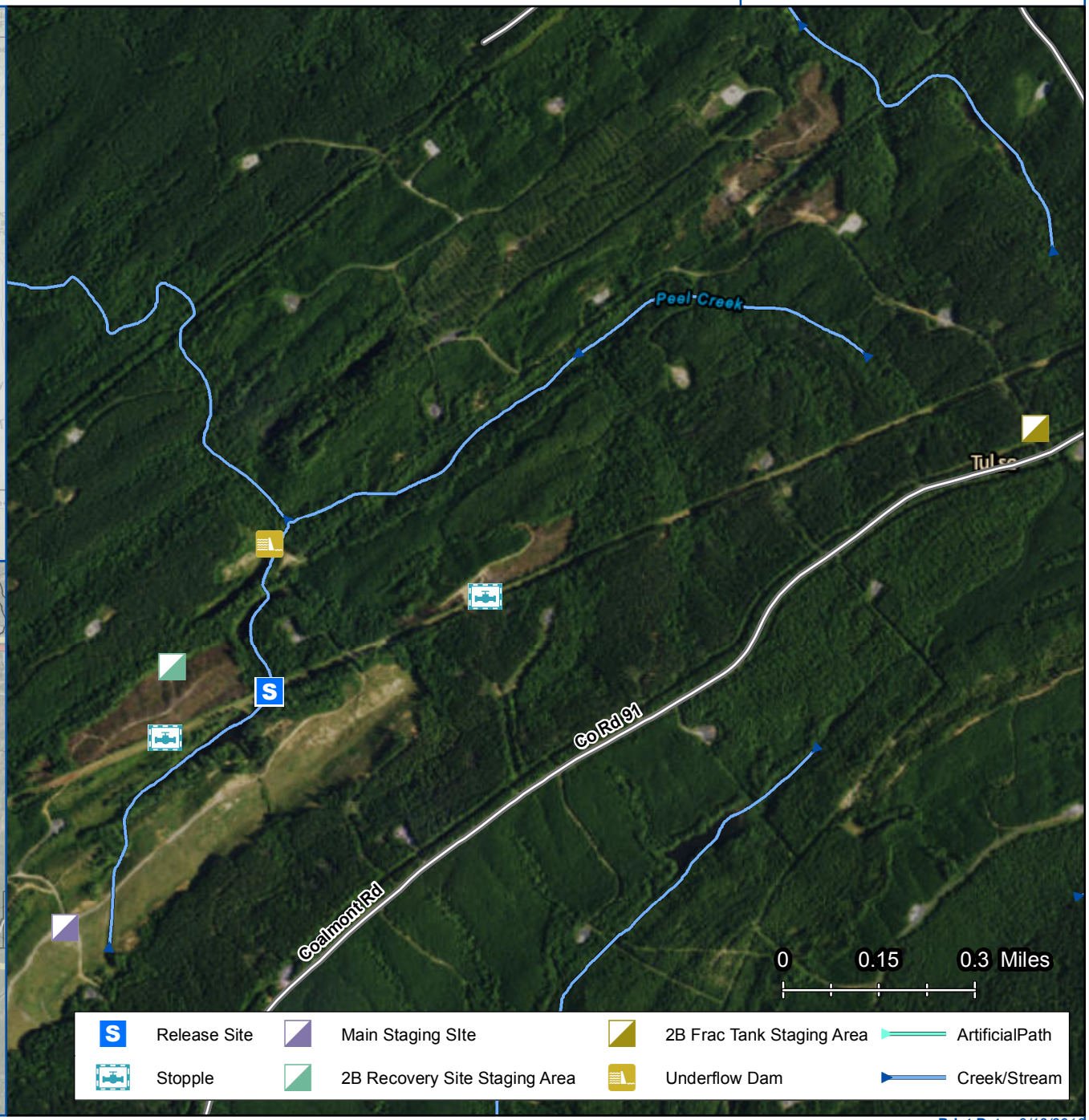
CR-91 Event

Site Location

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL





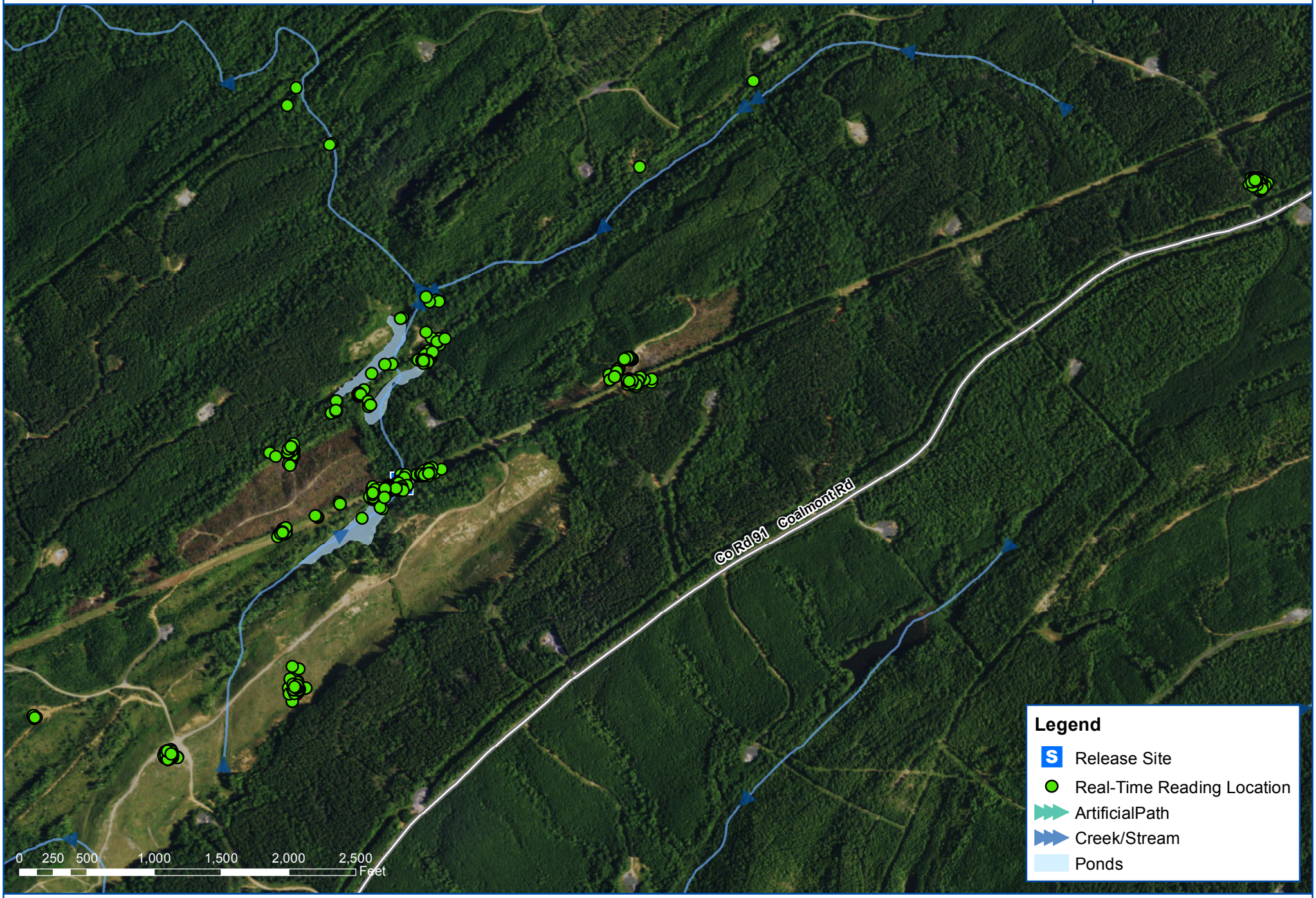


PROJECTION SYSTEM: *UTM16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/13/2016*

Manually-Logged Real-Time Reading Locations

CR-91 Event | 09/18/2016 05:00 – 09/18/2016 17:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



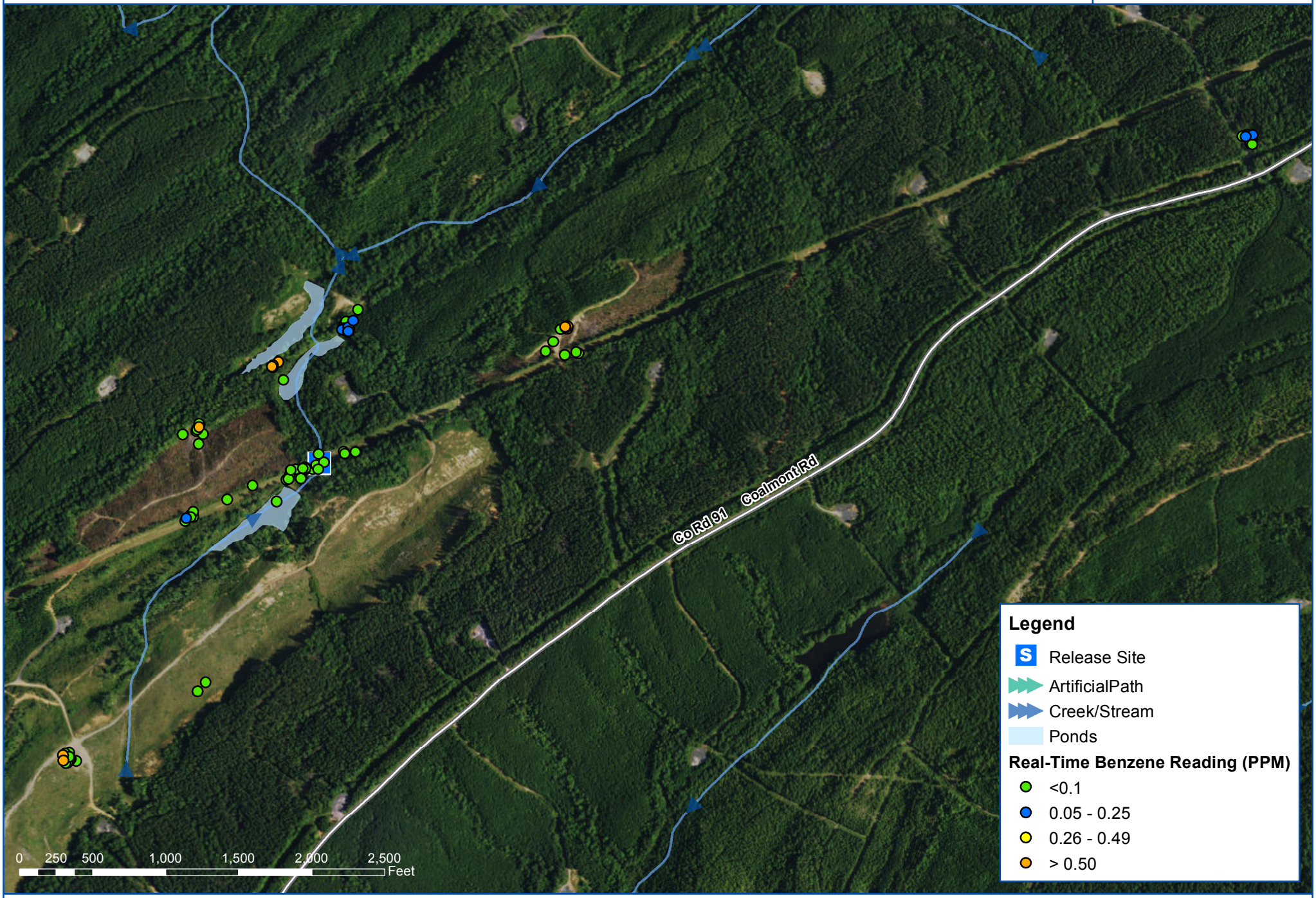
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | Benzene

CR-91 Event | 09/18/2016 05:00 – 09/18/2016 17:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



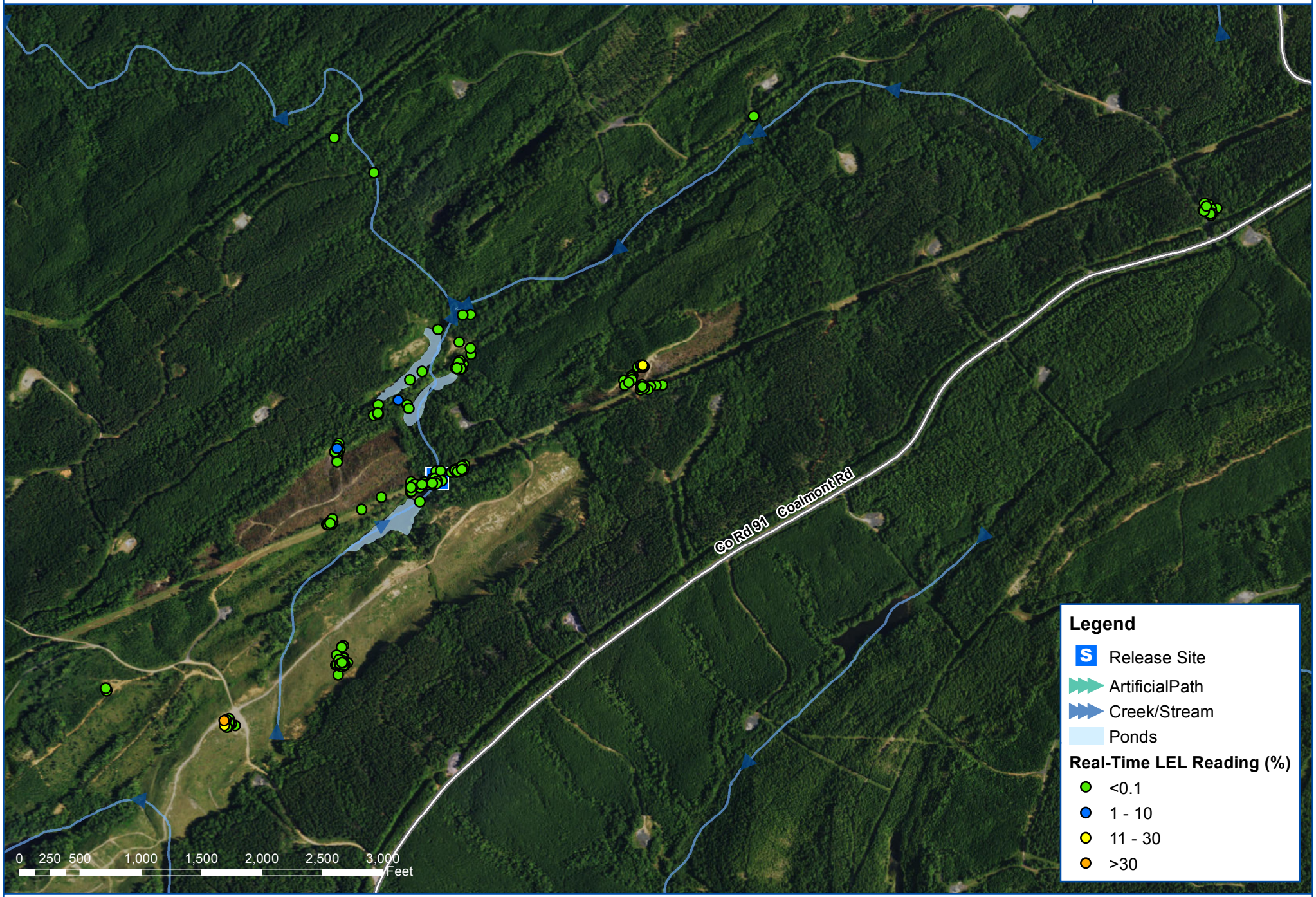
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | LEL

CR-91 Event | 09/18/2016 05:00 – 09/18/2016 17:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



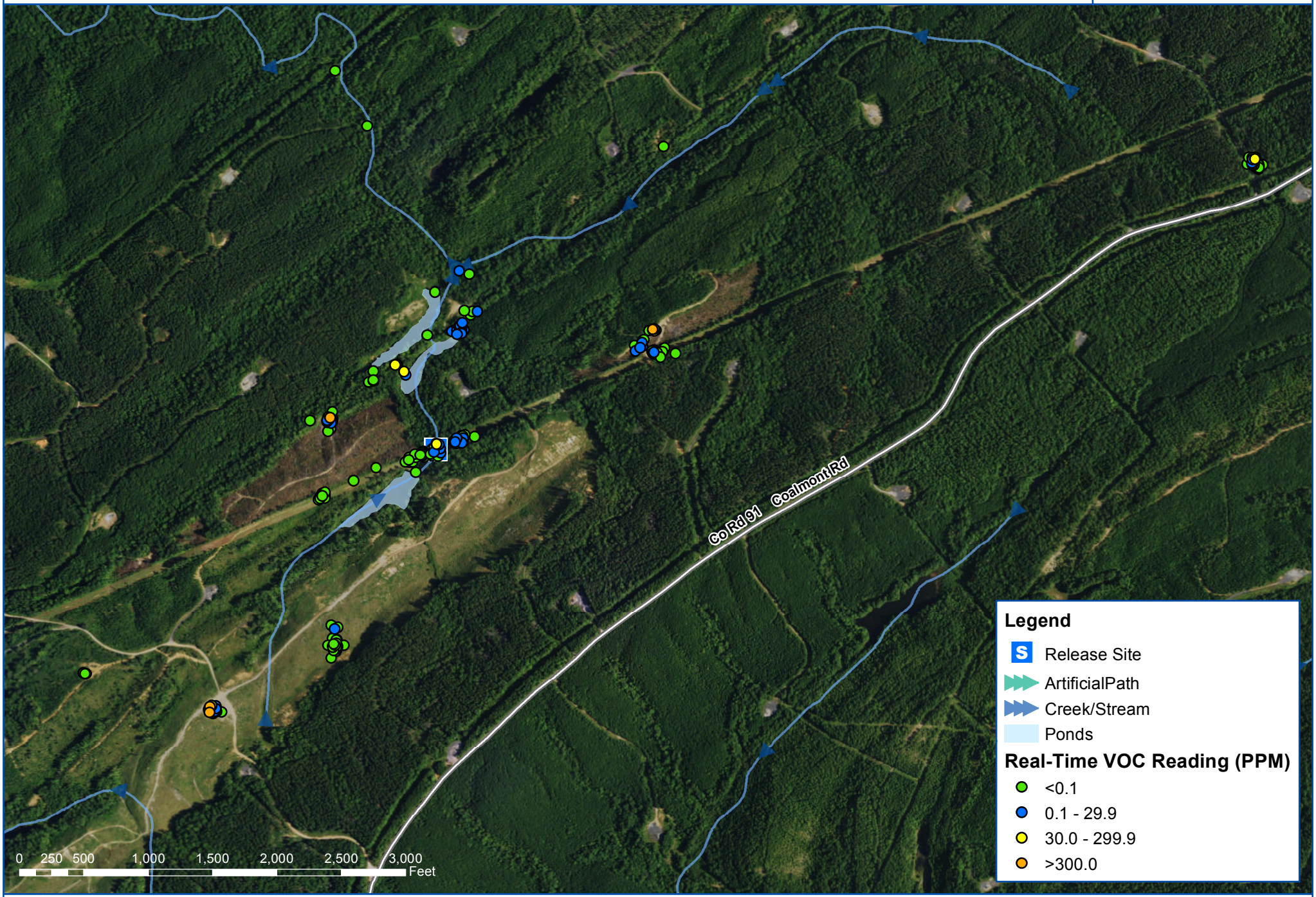
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | VOC

CR-91 Event | 09/18/2016 05:00 – 09/18/2016 17:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

**GPS coordinates are approximate*

Appendix II:

Remote Telemetering Air Monitoring Graphs

Remote Telemetering Real-time Air Monitoring | VOC

CR-91 Event | 9/18/2016 05:00 to 9/18/2016 16:59

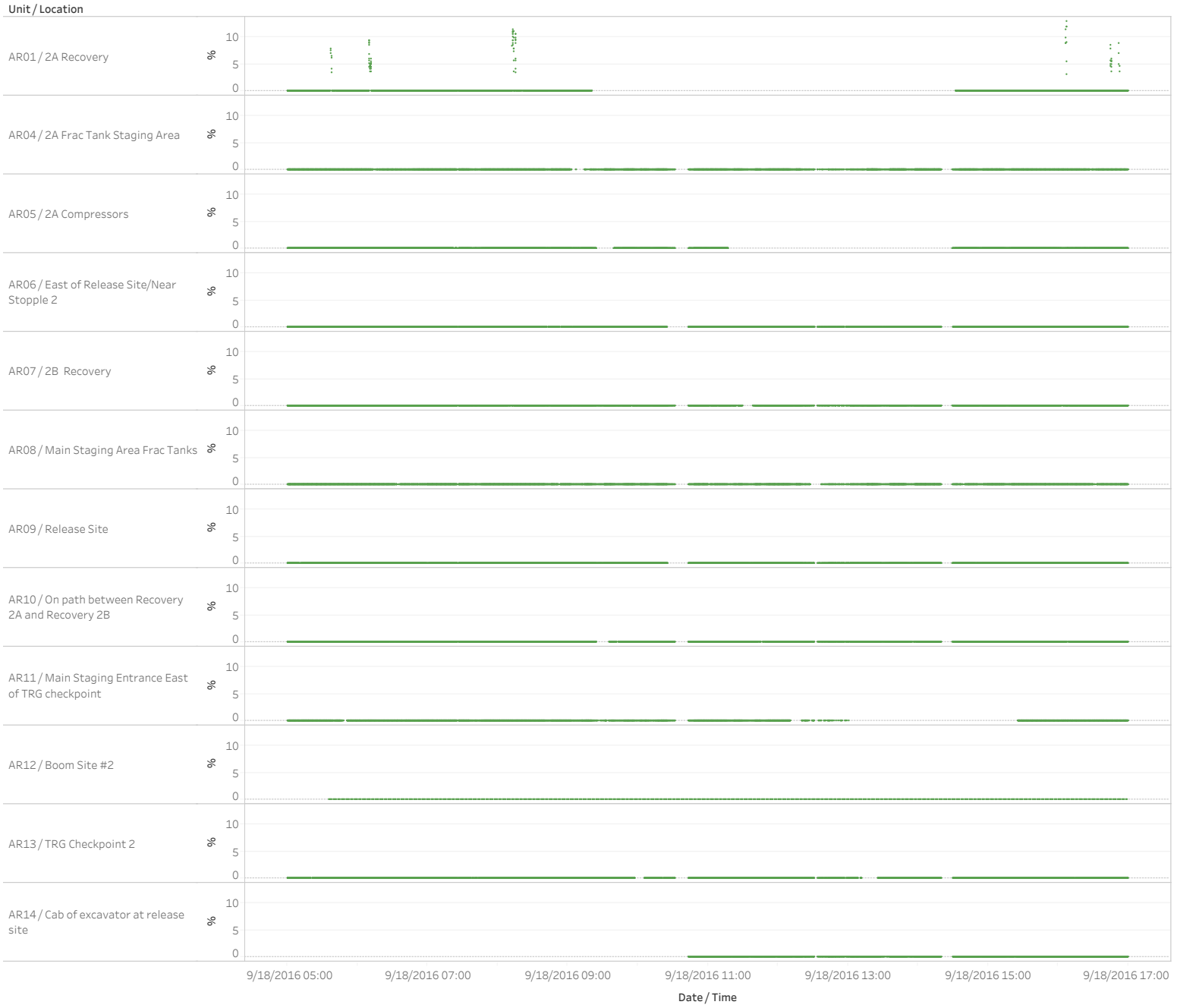
VOC readings are a true representation of atmospheric conditions (appropriate correction factors have been applied to field values).

Remote Telemetering Real-time Air Monitoring | Oxygen

CR-91 Event | 9/18/2016 05:00 to 9/18/2016 16:59

Remote Telemetering Real-time Air Monitoring | LEL

CR-91 Event | 9/18/2016 05:00 to 9/18/2016 16:59



LEL readings are a true representation of atmospheric conditions (appropriate correction factors have been applied to field values).